

**WHAT IS CLAIMED IS:**

1. An apparatus comprising:  
a plurality of ports each adapted to receive Ethernet packets; and  
a data-link layer switch controller, when one of the Ethernet packets comprises an  
Internet protocol (IP) multicast packet comprising an IP multicast destination address and an  
IP source address, to select one or more of the ports based upon the IP multicast destination  
address and the IP source address;  
wherein the selected one or more ports transmit the Ethernet packet.
2. The apparatus of claim 1:  
wherein the IP multicast packet comprises a virtual local area network identifier  
(VLAN ID); and  
wherein the data-link layer switch controller is further to select the one or more of the  
ports based upon the IP multicast destination address, the IP source address, and the VLAN  
ID.
3. The apparatus of claim 1, further comprising:  
a memory to store associations between IP addresses and the ports;  
wherein, to select one or more of the ports based upon the IP multicast destination  
address and the IP source address, the data-link layer switch controller is further to select the  
one or more of the ports based upon the associations stored in the memory.
4. The apparatus of claim 3, wherein, to select one or more of the ports based  
upon the IP multicast destination address and the IP source address, the data-link layer switch  
controller is further:  
to identify one of the associations stored in the memory based on the IP multicast  
destination address and the IP source address; and  
to confirm the association is an association between an IP address and the ports.

5. The apparatus of claim 4, wherein, to identify one of the associations stored in the memory based on the IP multicast destination address and the IP source address, the data-link layer switch controller is further:

to generate a key based on the IP multicast destination address and the IP source address; and

to identify the one of the associations based on the key.

6. The apparatus of claim 4, wherein, to confirm the association is an association between an IP address and the ports, the data-link layer switch controller is further:

to determine whether the association is marked as an IP multicast association.

7. The apparatus of claim 6, wherein, to determine whether the association is marked as an IP multicast association, the data-link layer switch controller is further:

to determine whether a flag stored in the memory and corresponding to the association is set.

8. The apparatus of claim 4, wherein the data-link layer switch controller, when the data-link layer switch controller cannot identify one of the associations stored in the memory based on the IP multicast destination address and the IP source address, is further to generate a message requesting the creation of an association for the IP multicast destination address and the IP source address.

9. The apparatus of claim 4, wherein the data-link layer switch controller, when the data-link layer switch controller cannot identify one of the associations stored in the memory based on the IP multicast destination address and the IP source address, is further to transmit the Ethernet packet from the ports as destination unknown.

10. The apparatus of claim 8, further comprising:  
a central processing unit to create the association for the IP multicast destination address and the IP source address.

11. The apparatus of claim 1:

wherein the data-link layer switch controller, when one of the Ethernet packets comprises a Media Access Control (MAC) multicast packet comprising a MAC multicast destination address and does not comprise an IP multicast packet, is further to select one or more of the ports based upon the MAC multicast destination address;

wherein the selected one or more ports transmit the Ethernet packet.

12. The apparatus of claim 11:

wherein the MAC multicast packet comprises a virtual local area network identifier (VLAN ID); and

wherein the data-link layer switch controller, is further to select the one or more of the ports based upon the MAC multicast destination address and the VLAN ID.

13. The apparatus of claim 11, further comprising:

a memory to store associations between MAC addresses and the ports;

wherein, to select one or more of the ports based upon the MAC multicast destination address, the data-link layer switch controller is further to select the one or more of the ports based upon the associations stored in the memory.

14. The apparatus of claim 13, wherein, to select one or more of the ports based upon the MAC multicast destination address, the data-link layer switch controller is further:

to identify one of the associations stored in the memory based on the MAC multicast destination address; and

to confirm the association is an association between a MAC address and the ports.

15. The apparatus of claim 14, wherein, to identify one of the associations stored in the memory based on the MAC multicast destination address, the data-link layer switch controller is further:

to generate a key based on the MAC multicast destination address; and

to identify the one of the associations based on the key.

16. The apparatus of claim 14, wherein, to confirm the association is an association between a MAC address and the ports, the data-link layer switch controller is further:

to determine whether the association is marked as a MAC multicast association.

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17. The apparatus of claim 16, wherein, to determine whether the association is marked as a MAC multicast association, the data-link layer switch controller is further:

to determine whether a flag stored in the memory and corresponding to the association is clear.

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18. The apparatus of claim 11, further comprising:

a memory to store a bridge table comprising a plurality of entries each identifying one or more of the ports and addressable by a key;

wherein, to select one or more of the ports based upon the IP multicast destination address and the IP source address, the data-link layer switch controller is further to generate the key based upon the IP multicast destination address and the IP source address;

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wherein, to select one or more of the ports based upon the MAC multicast destination address, the data-link layer switch controller is further to generate the key based upon the MAC multicast destination address; and

wherein the selected ports comprise the ports identified by the bridge table entry addressed by the key.

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19. An integrated circuit comprising the apparatus of claim 1.

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20. An Ethernet switch comprising the apparatus of claim 1.

21. An apparatus comprising:

a plurality of port means for receiving Ethernet packets; and

data-link layer switch controller means, when one of the Ethernet packets comprises an Internet protocol (IP) multicast packet comprising an IP multicast destination address and

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an IP source address, for selecting one or more of the port means based upon the IP multicast destination address and the IP source address;

wherein the selected one or more port means transmit the Ethernet packet.

5           22.     The apparatus of claim 21:

wherein the IP multicast packet comprises a virtual local area network identifier (VLAN ID); and

wherein the data-link layer switch controller means is further for selecting the one or more of the port means based upon the IP multicast destination address, the IP source  
10     address, and the VLAN ID.

23.     The apparatus of claim 21, further comprising:

memory means for storing associations between IP addresses and the port means;

wherein, to select one or more of the port means based upon the IP multicast  
15     destination address and the IP source address, the data-link layer switch controller means is further for selecting the one or more of the port means based upon the associations stored in the memory.

24.     The apparatus of claim 23, wherein, for selecting one or more of the port  
20     means based upon the IP multicast destination address and the IP source address, the data-link layer switch controller is further:

for identifying one of the associations stored in the memory based on the IP multicast destination address and the IP source address; and

for confirming the association is an association between an IP address and the port  
25     means.

25.     The apparatus of claim 24, wherein, for identifying one of the associations stored in the memory based on the IP multicast destination address and the IP source address, the data-link layer switch controller is further:

for generating a key based on the IP multicast destination address and the IP source  
30     address; and

for identifying the one of the associations based on the key.

26. The apparatus of claim 24, wherein, for confirming the association is an association between an IP address and the port means, the data-link layer switch controller means is further:

for determining whether the association is marked as an IP multicast association.

27. The apparatus of claim 26, wherein, for determining whether the association is marked as an IP multicast association, the data-link layer switch controller means is further:

for determining whether a flag stored in the memory and corresponding to the association is set.

28. The apparatus of claim 24, wherein the data-link layer switch controller means, when the data-link layer switch controller means cannot identify one of the associations stored in the memory based on the IP multicast destination address and the IP source address, is further for generating a message requesting the creation of an association for the IP multicast destination address and the IP source address.

29. The apparatus of claim 24, wherein the data-link layer switch controller means, when the data-link layer switch controller means cannot identify one of the associations stored in the memory based on the IP multicast destination address and the IP source address, is further for transmitting the Ethernet packet from the port means as destination unknown.

30. The apparatus of claim 28, further comprising:  
central processing unit means for creating the association for the IP multicast destination address and the IP source address.

31. The apparatus of claim 21:  
wherein the data-link layer switch controller means, when one of the Ethernet packets comprises a Media Access Control (MAC) multicast packet comprising a MAC multicast

destination address and does not comprise an IP multicast packet, is further for selecting one or more of the port means based upon the MAC multicast destination address;

wherein the selected one or more port means transmit the Ethernet packet.

5           32.     The apparatus of claim 31:

wherein the MAC multicast packet comprises a virtual local area network identifier (VLAN ID); and

wherein the data-link layer switch controller means is further for selecting the one or more of the port means based upon the MAC multicast destination address and the VLAN ID.

10           33.     The apparatus of claim 31, further comprising:

memory means for storing associations between MAC addresses and the port means;

wherein, for selecting one or more of the port means based upon the MAC multicast destination address, the data-link layer switch controller means is further for selecting the one or more of the port means based upon the associations stored in the memory means.

15           34.     The apparatus of claim 33, wherein, to select one or more of the port means based upon the MAC multicast destination address, the data-link layer switch controller means is further:

for identifying one of the associations stored in the memory means based on the MAC multicast destination address; and

for confirming the association is an association between a MAC address and the port means.

20           35.     The apparatus of claim 34, wherein, for identifying one of the associations stored in the memory means based on the MAC multicast destination address, the data-link layer switch controller means is further:

for generating a key based on the MAC multicast destination address; and

for identifying the one of the associations based on the key.

36. The apparatus of claim 34, wherein, for confirming the association is an association between a MAC address and the port means, the data-link layer switch controller means is further:

for determining whether the association is marked as a MAC multicast association.

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37. The apparatus of claim 36, wherein, for determining whether the association is marked as a MAC multicast association, the data-link layer switch controller means is further:

for determine whether a flag stored in the memory means and corresponding to the association is clear.

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38. The apparatus of claim 31, further comprising:

memory means for storing a bridge table comprising a plurality of entries each identifying one or more of the port means and addressable by a key;

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wherein, for selecting one or more of the port means based upon the IP multicast destination address and the IP source address, the data-link layer switch controller means is further for generating the key based upon the IP multicast destination address and the IP source address;

wherein, for selecting one or more of the port means based upon the MAC multicast destination address, the data-link layer switch controller means is further for generating the key based upon the MAC multicast destination address; and

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wherein the selected port means comprise the port means identified by the bridge table entry addressed by the key.

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39. An integrated circuit comprising the apparatus of claim 21.

40. An Ethernet switch comprising the apparatus of claim 21.

41. A method for a data-link layer switch comprising a plurality of ports, the method comprising:

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receiving an Ethernet packet on one of the ports;



when the Ethernet packet comprises an Internet protocol (IP) multicast packet comprising an IP multicast destination address and an IP source address, selecting one or more others of the ports based upon the IP multicast destination address and the IP source address; and

5 transmitting the Ethernet packet from the selected one or more ports.

42. The method of claim 41, wherein the IP multicast packet comprises a virtual local area network identifier (VLAN ID), further comprising:

10 selecting the one or more of the ports based upon the IP multicast destination address, the IP source address, and the VLAN ID.

43. The method of claim 41, further comprising:

storing associations between IP addresses and the ports; and

15 wherein selecting one or more of the ports based upon the IP multicast destination address and the IP source address comprises selecting the one or more of the ports based upon the associations.

44. The method of claim 43, wherein selecting one or more of the ports based upon the IP multicast destination address and the IP source address comprises:

20 identifying one of the associations based on the IP multicast destination address and the IP source address; and

confirming the association is an association between an IP address and the ports.

25 45. The method of claim 44, wherein identifying one of the associations based on the IP multicast destination address and the IP source address comprises:

generating a key based on the IP multicast destination address and the IP source address; and

identifying the one of the associations based on the key.

30 46. The method of claim 44, wherein confirming the association is an association between an IP address and the ports comprises:

determining whether the association is marked as an IP multicast association.

47. The method of claim 46, wherein determining whether the association is marked as an IP multicast association comprises:

5 determining whether a flag corresponding to the association is set.

48. The method of claim 44, further comprising:

generating a message requesting the creation of an association for the IP multicast destination address and the IP source address when an association cannot be identified based  
10 on the IP multicast destination address and the IP source address.

49. The method of claim 44, further comprising:

transmitting the Ethernet packet from the ports as destination unknown.

15 50. The method of claim 48, further comprising:

creating the association for the IP multicast destination address and the IP source address.

51. The method of claim 41:

20 when the Ethernet packet comprises a Media Access Control (MAC) multicast packet comprising a MAC multicast destination address and does not comprise an IP multicast packet, selecting one or more of the ports based upon the MAC multicast destination address; and

transmitting the Ethernet packet from the selected one or more ports.

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52. The method of claim 51, wherein the MAC multicast packet comprises a virtual local area network identifier (VLAN ID), further comprising:

selecting the one or more of the ports based upon the MAC multicast destination address and the VLAN ID.

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53. The method of claim 51, further comprising:

storing associations between MAC addresses and the ports;  
wherein selecting one or more of the ports based upon the MAC multicast destination address comprises selecting the one or more of the ports based upon the associations.

5           54.     The method of claim 53, wherein selecting one or more of the ports based upon the MAC multicast destination address comprises:

identifying one of the associations based on the MAC multicast destination address;  
and  
confirming the association is an association between a MAC address and the ports.

10           55.     The method of claim 54, wherein identifying one of the associations stored in the memory based on the MAC multicast destination address comprises:

generating a key based on the MAC multicast destination address; and  
identifying the one of the associations based on the key.

15           56.     The method of claim 54, wherein confirming the association is an association between a MAC address and the ports comprises:

determining whether the association is marked as a MAC multicast association.

20           57.     The method of claim 56, wherein determining whether the association is marked as a MAC multicast association comprises:

determining whether a flag stored in the memory and corresponding to the association is clear.

25           58.     The method of claim 51, further comprising:

storing a bridge table comprising a plurality of entries each identifying one or more of the ports and addressable by a key;

wherein selecting one or more of the ports based upon the IP multicast destination address and the IP source address comprises generating the key based upon the IP multicast  
30 destination address and the IP source address;

wherein selecting one or more of the ports based upon the MAC multicast destination address comprises generating the key based upon the MAC multicast destination address; and

wherein the selected ports comprise the ports identified by the bridge table entry addressed by the key.

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59. A computer program embodying instructions executable by a computer for a data-link layer switch comprising a plurality of ports, comprising:

when an Ethernet packet received on one of the ports comprises an Internet protocol (IP) multicast packet comprising an IP multicast destination address and an IP source address, selecting one or more others of the ports based upon the IP multicast destination address and the IP source address; and

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causing the data-link layer switch to transmit the Ethernet packet from the selected one or more ports.

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60. The computer program of claim 59, wherein the IP multicast packet comprises a virtual local area network identifier (VLAN ID), further comprising:

selecting the one or more of the ports based upon the IP multicast destination address, the IP source address, and the VLAN ID.

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61. The computer program of claim 59, further comprising:

storing associations between IP addresses and the ports; and

wherein selecting one or more of the ports based upon the IP multicast destination address and the IP source address comprises selecting the one or more of the ports based upon the associations.

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62. The computer program of claim 61, wherein selecting one or more of the ports based upon the IP multicast destination address and the IP source address comprises:

identifying one of the associations based on the IP multicast destination address and the IP source address; and

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confirming the association is an association between an IP address and the ports.

63. The computer program of claim 62, wherein identifying one of the associations based on the IP multicast destination address and the IP source address comprises:

generating a key based on the IP multicast destination address and the IP source  
5 address; and  
identifying the one of the associations based on the key.

64. The computer program of claim 62, wherein confirming the association is an association between an IP address and the ports comprises:

10 determining whether the association is marked as an IP multicast association.

65. The computer program of claim 64, wherein determining whether the association is marked as an IP multicast association comprises:

determining whether a flag corresponding to the association is set.

15 66. The computer program of claim 62, further comprising:

generating a message requesting the creation of an association for the IP multicast destination address and the IP source address when an association cannot be identified based on the IP multicast destination address and the IP source address.

20 67. The computer program of claim 62, further comprising:

causing the data-link layer switch to transmit the Ethernet packet from the ports as destination unknown.

25 68. The computer program of claim 66, further comprising:

creating the association for the IP multicast destination address and the IP source address.

69. The computer program of claim 59:

30 when the Ethernet packet comprises a Media Access Control (MAC) multicast packet comprising a MAC multicast destination address and does not comprise an IP multicast

packet, selecting one or more of the ports based upon the MAC multicast destination address;  
and

causing the data-link layer switch to transmit the Ethernet packet from the selected  
one or more ports.

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70. The computer program of claim 69, wherein the MAC multicast packet  
comprises a virtual local area network identifier (VLAN ID), further comprising:

selecting the one or more of the ports based upon the MAC multicast destination  
address and the VLAN ID.

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71. The computer program of claim 69, further comprising:

storing associations between MAC addresses and the ports;

wherein selecting one or more of the ports based upon the MAC multicast destination  
address comprises selecting the one or more of the ports based upon the associations.

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72. The computer program of claim 71, wherein selecting one or more of the ports  
based upon the MAC multicast destination address comprises:

identifying one of the associations based on the MAC multicast destination address;

and

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confirming the association is an association between a MAC address and the ports.

73. The computer program of claim 72, wherein identifying one of the  
associations stored in the memory based on the MAC multicast destination address  
comprises:

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generating a key based on the MAC multicast destination address; and

identifying the one of the associations based on the key.

74. The computer program of claim 72, wherein confirming the association is an  
association between a MAC address and the ports comprises:

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determining whether the association is marked as a MAC multicast association.

75. The computer program of claim 74, wherein determining whether the association is marked as a MAC multicast association comprises:

determining whether a flag stored in the memory and corresponding to the association is clear.

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76. The computer program of claim 69, further comprising:

storing a bridge table comprising a plurality of entries each identifying one or more of the ports and addressable by a key;

10 wherein selecting one or more of the ports based upon the IP multicast destination address and the IP source address comprises generating the key based upon the IP multicast destination address and the IP source address;

wherein selecting one or more of the ports based upon the MAC multicast destination address comprises generating the key based upon the MAC multicast destination address; and

15 wherein the selected ports comprise the ports identified by the bridge table entry addressed by the key.